REMARKS

SUMMARY:

The present application previously set forth prior claims 19-21 and 24-25, of which claims 19 and 25 are independent claims. New claims 26-33 are newly presented for consideration, and the total active claims are 19-21 and 24-33.

Prior claim 25 stands rejected under 35 U.S.C. §102(b) as being allegedly anticipated by U.S. Patent No. 4,800,459 (Takagi et al.). Prior claims 19 and 22-24 stand rejected under 35 U.S.C. §103(a) as allegedly obvious over U.S. Patent No. 4,800,459 (Takagi et al.) in view of U.S. Patent Application Publication No. 2002/0145203 (Adae-Amoakoh et al.). Prior claims 20 and 21 stand rejected under 35 U.S.C. §103(a) as allegedly obvious over U.S. Patent No. 4,800,459 (Takagi et al.) in view of U.S. Patent Application Publication No. 2002/0145203 (Adae-Amoakoh et al.) and U.S. Patent No. 6,471,525 (Fan et al.).

Responses to the rejections summarized above (including traversal of the prior art rejections) are hereafter presented with respect to each individual argument presented by the Examiner.

REJECTION OF PRIOR CLAIM 25 (35 U.S.C. §102(b)):

Prior claim 25 stands rejected under 35 U.S.C. §102(b) as being allegedly anticipated by U.S. Patent No. 4,800,459 (Takagi et al.).

As presently amended, claim 25 is set forth to include an additional feature, namely that the first and second device layers comprise an epoxy fiberglass composite material. Such feature as presently set forth is not disclosed in Takagi et al., and thus such reference cannot by law serve to anticipate claim 25.

By utilizing an epoxy fiberglass composite material in the multi-layer electronic device set forth in present claim 25, device preparation is effected with relatively low processing temperatures, such as would seldom exceed 300 degrees Celsius. There are many advantages to utilizing such a low temperature system. One advantage is that there will be no shrinkage of the passive components integrated into the multilayer electronic device as set forth in present claim 25. Low temperature processing (less than 300 degrees Celsius) can be effected in a normal atmosphere (i.e., not requiring a

reducing atmosphere or other specialized conditions). Furthermore, utilization of low temperature processing accommodates a wide variety of passive components, as the parts do not need to withstand the very high processing temperatures for devices made with certain other materials than epoxy-fiberglass composite material. It should be appreciated by one of ordinary skill in the art that some parts, such as resistors and parts containing tantalum, have a hard time with increased solder temperatures. Versatility in component selection, including an ability to utilized parts that are not required to withstand generally higher processing temperatures, also typically means that less expensive components may be utilized, thus yielding a still further advantage by employing low temperature materials such as the epoxy-fiberglass composite material set forth in present claim 25.

In contrast to the multilayer electronic device set forth in present claim 25, which includes first and second device layers made of an epoxy-fiberglass composite material, Takagi et al. discloses the use of a ceramic system, which is constructed in a green state, and then fired at a relatively high temperature in a reducing atmosphere. Column 4, line 18 and other lines in such reference label their processing temperature as "low", but compared to the processing temperatures associated with epoxy-fiberglass composite materials, the processing temperatures of Takagi et al. are much higher. More particularly, Takagi et al. discloses sintering of its ceramic system at temperatures on the order of about 900 to 1000 degrees Celsius (see col. 7, lines 1-3). Many passive components available at the time of the present invention could not survive such high processing temperatures.

Since all elements set forth in claim 25 as presently amended are not disclosed in Takagi et al. , Applicants respectfully submit that present claim 25 is in condition for allowance and acknowledgement of the same is earnestly solicited. Furthermore, since newly presented claims 29-33 variously depend from otherwise allowable claim 25 and further limit same, claims 29-33 should also be allowable.

REJECTION OF PRIOR CLAIMS 19 AND 22-24 (35 U.S.C. §103(a)):

Prior claims 19 and 22-24 stand rejected under 35 U.S.C. §103(a) as allegedly obvious over U.S. Patent No. 4,800,459 (Takagi et al.) in view of U.S. Patent

Application Publication No. 2002/0145203 (Adae-Amoakoh). In view of the remarks presented hereafter, Applicant respectfully traverses such alleged obviousness.

As presently amended, claim 19 is set forth to include an additional feature, namely that first and second device layers comprise an epoxy fiberglass composite material. Such feature as presently set forth in claim 19 is not disclosed singularly or in combination of the Takagi et al. and Adae-Amoakoh et al. references.

By utilizing an epoxy fiberglass composite material in the multi-layer electrical device set forth in present claim 19, device preparation is effected with relatively low processing temperatures, such as would seldom exceed 300 degrees Celsius. There are many advantages to utilizing such a low temperature system. One advantage is that there will be no shrinkage of the passive components integrated into the multilayer electrical device as set forth in present claim 19. Low temperature processing (less than 300 degrees Celsius) can be effected in a normal atmosphere (i.e., not requiring a reducing atmosphere or other specialized conditions). Furthermore, utilization of low temperature processing accommodates a wide variety of passive components, as the parts do not need to withstand the very high processing temperatures for devices made with certain other materials than epoxy-fiberglass composite material. It should be appreciated by one of ordinary skill in the art that some parts, such as resistors and parts containing tantalum, have a hard time with increased solder temperatures. Versatility in component selection, including an ability to utilized parts that are not required to withstand generally higher processing temperatures, also typically means that less expensive components may be utilized, thus yielding a still further advantage by employing low temperature materials such as the epoxy-fiberglass composite material set forth in present claim 19.

In contrast to the multilayer electrical device set forth in present claim 19, which includes first and second device layers made of an epoxy-fiberglass composite material, Takagi et al. discloses the use of a ceramic system, which is constructed in a green state, and then fired at a relatively high temperature in a reducing atmosphere. Column 4, line 18 and other lines in such reference label their processing temperature as "low", but compared to the processing temperatures associated with epoxy-fiberglass composite materials, the processing temperatures of Takagi et al. are much higher.

More particularly, Takagi et al. discloses sintering of its ceramic system at temperatures on the order of about 900 to 1000 degrees Celsius (see col. 7, lines 1-3). Many passive components available at the time of the present invention could not survive such high processing temperatures.

Applicant notes that the substrate portion disclosed in Adae-Amoakoh et al. is made in some embodiments of a structural dielectric such as epoxy resin or PTFE (see page 3, paragraph 30). As such, this reference also fails to disclose device layers made of an epoxy-fiberglass composite material as set forth in present claim 19.

Since all the elements set forth in claim 19 as presently amended are not disclosed singularly or in combination of the Takagi et al. and Adae-Amoakoh et al. references, Applicant respectfully submits that present claim 19 is in condition for allowance and acknowledgement of the same is earnestly solicited. Since claim 24 (and other newly presented claims 26-28) variously depend from otherwise allowable claim 19 and further limit same, claim 24 and the other newly presented claims 26-28 should also be allowable.

REJECTION OF PRIOR CLAIMS 20 AND 21 (35 U.S.C. §103(a)):

Prior claims 20 and 21 stand rejected under 35 U.S.C. §103(a) as allegedly obvious over U.S. Patent No. 4,800,459 (Takagi et al.) in view of U.S. Patent Application Publication No. 2002/0145203 (Adae-Amoakoh) and U.S. Patent No. 6,471,525 (Fan et al.). In view of the remarks presented hereafter, Applicant respectfully traverses such alleged obviousness.

As presently amended, claim 19 (from which claims 20 and 21 depend) is set forth to include an additional feature, namely that first and second device layers comprise an epoxy fiberglass composite material. Claim 20 more particularly sets forth that the epoxy fiberglass composite material forming first and second device layers comprises FR4. Such features as presently set forth in claims 19-21 are not disclosed singularly or in combination of the Takagi et al. and Adae-Amoakoh et al. references. Some advantages of utilizing an epoxy fiberglass composite material (which would include FR4) as well as a brief description of the differences between such materials and the technology set forth in the Takagi et al. and Adae-Amoakoh et al. references

was discussed with reference to present claim 19 in the immediately preceding section. Applicant submits that such comments should equally apply now to claims 20 and 21, since such claims variously depend from independent claim 19.

The 8/15/03 Office Action correctly notes the lack of disclosure in Takagi et al. of an FR4 material on numbered page 5. However, in attempt to satisfy the deficiencies of the base reference Takagi et al., the Office Action further points to the disclosure of an FR4 material in Fan et al. Applicant submits that there is no suggestion or motivation to combine such references, and thus no *prima facie* case of obviousness has been properly established.

The O8/15/03 Office Action suggests that the technology of Takagi et al. could be modified to include the use of FR4 material as disclosed in Fan et al., alleging that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Takagi et al. to include the use of FR4 as disclosed in Fan because it aids in the providing of a coefficient of thermal expansion that matches surrounding structures". However, the surrounding structures in Takagi et al. are ceramic, which typically has a very different coefficient of thermal expansion than FR4 or other epoxy fiberglass composite materials. So the alleged motivation for combining the Takagi et al. and Fan et al. references, actually teaches away from the proposed modification of substituting FR4 for the ceramic layers of Takagi et al.

Furthermore, Applicant submits that modification of the circuit substrate of Takagi et al. to be made of the FR4 material as disclosed in Fan et al. would render the Takagi et al. reference unsatisfactory for its intended purpose. More particularly, utilization of an epoxy-fiberglass material such as FR4 in place of the disclosed green ceramic layers would destroy the functionality of the disclosed system. The epoxy-fiberglass composite material would not survive the high processing temperatures (on the order of about 900-1000 degrees Celsius) of the system disclosed in Takagi et al. Also, many passive components available at the time of the present invention and integrated with the electrical device set forth in present claims 20 and 21 could not survive such high processing temperatures. In regard to the basic requirements of a *prima facie* case of obviousness, §2143.01 of the Manual of Patent Examining Procedure (MPEP) sets forth that "if proposed modification would render the prior art

invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

Applicant respectfully traverses the 35 U.S.C. §103(a) rejection of prior claims 20 and 21 because there is no suggestion or motivation to combine the Fan et al. and Takagi et al. references. More particularly, Fan et al. teaches away from the proposed modification of Takagi et al, and any such modification would destroy the intended function of Takagi et al. As such, this combination of references would be inappropriate if applied to any claims as presently set forth in the subject application.

CONCLUSION:

Inasmuch as all outstanding issues have been addressed it is respectfully submitted that the present application, including claims 19-21 and 24-33, is in complete condition for issuance of a formal Notice of Allowance, and action to such effect is earnestly solicited. The Examiner is invited to telephone the undersigned at his convenience should only minor issues remain after consideration of this Amendment and Response in order to permit early resolution of the same.

Respectfully submitted,

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